

R E M A R K S

Claims 1, 2, 4, 6-10 and 12-17 are pending in this application. Claims 1 and 4 have been amended. No new matter has been added by way of these amendments because each amendment is supported by the present specification. For example, the amendment to claim 1 is supported by the present specification at page 11, line 15. Support for amended claim 4 is found at page 8, lines 16-17. Thus, no new matter has been added.

Based upon the above considerations, entry of the present amendment is respectfully requested.

In view of the following remarks, Applicants respectfully request that the Examiner withdraw all rejections and allow the currently pending claims.

***Issues under 35 U.S.C. §§ 102(b) and 103(a)***

Claims 1, 2, 4 and 6 stand rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Schreyer (U.S. Patent Number 3,085,083; hereinafter Schreyer '083), Bailey et al. (U.S. Patent Number 3,969,435; hereinafter Bailey '435) or Roura (U.S. Patent Number 4,001,351; hereinafter Roura '351). Also, claims 1, 2 4 and 6 are rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Carlson (U.S. Patent

Number 3,674,758; hereinafter Carlson '758) as evidence by Bro (U.S. Patent Number 2,946,763; hereinafter Bro '763). Further, claims 1, 2 and 4 are rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Goldmann et al. (U.S. Patent Number 5,861,464; hereinafter Goldmann '464). Applicants respectfully traverse.

#### The Present Invention and Its Advantages

Many conventional fluorine-containing polymers have undesirable bubbles and coloration. For example, when the emulsion polymerized copolymer of tetrafluoroethylene and hexafluoropropylene is melt processed (in obtaining the final product), bubbles or voids form due to the instability of the polymer chain ends upon the heating and the shear force. Undesirable coloration can be caused by the severity of the melting conditions, the presence of contamination, the residues of the polymerization initiators, carbonization of low molecular weight materials, etc. (as explained in the present specification at page 2, lines 12-18).

In contrast, the present invention has achieved a stabilized fluorine-containing polymer that can prevent such foaming and brown or grayish brown coloration of a fluorine-containing polymer having a terminal carboxylic acid group. Also, the present invention can stabilize the unstable bonds in the backbones.

Specifically, the present invention involves a melt formed tetrafluoroethylene-hexfluoropropylene copolymer containing  $1.0 \times 10^{14}$  spins/g or less of unpaired electrons on the carbon atoms in terms of a spin density measured with electron spin resonance at a temperature of 10K and 50 ppm or less of a basic component and having a volatile index (VI) of 25 or less.

In another embodiment, the present invention is directed to a melt formed tetrafluoroethylene-hexfluoropropylene copolymer that is obtained by adding 0.1 to 10 % of a compound comprising an alkali metal or an alkaline earth metal in terms of the number of atoms of the alkali metal or the alkaline earth metal based on the total number of the above terminal groups to the tetrafluoroethylene-hexfluoropropylene copolymer, and heating the tetrafluoroethylene-hexfluoropropylene copolymer at a temperature of at least 200°C in an atmosphere containing moisture while kneading.

Even the advantages of the present invention have been experimentally confirmed. As can be seen from the Tables and comparative examples (see the specification starting at page 13), the unstable terminal groups of the fluorine-containing polymers are stabilized so that the coloration of the polymers after the melt-forming or sintering is avoided. Further, in some instances, the unstable bonds in the backbones are also stabilized.

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In contrast, the cited references fail to disclose all features and advantages of the present invention.

Distinctions over the Schreyer '083 Reference

The Schreyer '083 reference is directed to a process of making fluorocarbon polymers by end-capping (see Col. 1, lines 9-14), and discloses treating a TFE-HFP copolymer with sodium sulfate (see Example IV at Cols. 6-7). The Examiner refers to other portions of Schreyer '083 (at page 3 of the Office Action).

However, Applicants respectfully submit that the treated copolymers as disclosed in Schreyer '083 have a volatile index that is much larger than 25. The relatively large volatile index is due to the wet-heating of a polymer in a static state (i.e., without kneading). This undesirable feature of Schreyer '083 is also mentioned in Applicants' present specification at page 2, lines 6-18. As mentioned, the causes for coloration include the severity of the melting conditions, the present of contamination, left-over residue of the polymerization initiators, etc.

This disclosure in Schreyer '083 is in contrast to the present invention, which has a volatile index of 25 or less. Thus, because "a claim is only anticipated if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference," the cited Schreyer '083 reference

cannot be a basis for a rejection under § 102(b). See *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Accordingly, Applicants respectfully request the Examiner to withdraw this rejection.

Further, a *prima facie* case of obviousness cannot be based on the Schreyer '083 reference because the first requirement for a *prima facie* case of obviousness has not been satisfied.

U.S. case law squarely holds that a proper obviousness inquiry requires consideration of three factors: (1) the prior art reference must teach or suggest all the claim limitations; (2) whether or not the prior art would have taught, motivated, or suggested to those of ordinary skill in the art that they should make the claimed invention (or practice the invention in case of a claimed method or process); and (3) whether the prior art establishes that in making the claimed invention (or practicing the invention in case of a claimed method or process), there would have been a reasonable expectation of success. See *In re Vaeck*, 947 F.2d, 488, 493, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991); see also *In re Kotzab*, 55 U.S.P.Q.2d 1313, 1316-17 (Fed. Cir. 2000).

Here, because Schreyer '083 does not disclose the claimed volatile index, this rejection under § 103(a) is also overcome (since the first requirement for a *prima facie* case of obviousness has not been satisfied).

Applicants further note that kneading (i.e., as recited in claim 4) is also not disclosed by Schreyer '083.

In addition, the other requirements for a *prima facie* case of obviousness have not been satisfied. This is because one having ordinary skill in the art, upon reading Schreyer '083, cannot have the requisite motivation and reasonable expectation of success in achieving the present invention. In Schreyer '083, the polymers have a relatively higher volatile index.

In contrast, the present invention heats the copolymer in an atmosphere containing moisture while kneading. Thus, the copolymer can effectively stabilize so that the unstable terminal groups and unstable bonds can be removed. Therefore, the present invention has decreased the volatile index of the claimed copolymer. Nothing in Schreyer '083 suggests accomplishing the claimed volatile index range. Thus, Applicants respectfully submit that a *prima facie* case of obviousness has not been formed in view of Schreyer '083, and respectfully request the Examiner to reconsider and withdraw this rejection.

#### Distinctions over the Bailey '435 and Roura '351 References

Applicants respectfully submit that Bailey '435 and Roura '351 also do not anticipate or render the present invention as obvious.

The Bailey '435 reference is directed to a process for heat stabilizing copolymers of tetrafluoroethylene and hexafluoropropylene (see claim 1). The Roura '351 reference teaches a similar process, wherein the Examiner refers Applicants to claim 1.

However, neither Bailey '435 nor Roura '351 disclose the use of any base such as a compound comprising an alkali metal or an alkaline metal. Further, one skilled in the art would not be motivated or reasonably expect to be successful in producing the present invention upon reading the cited references because the processes as disclosed in Bailey '435 and Roura '351 cannot remove unstable terminal groups or unstable bonds in the backbones as instantly achieved by the present invention.

Thus, Applicants respectfully submit neither Bailey '435 or Rora '351 disclose all features as instantly claimed. Further, Applicants submit that a *prima facie* case of obviousness has not been formed in view of Bailey '435 or Roura '351, and respectfully request the Examiner to reconsider and withdraw these rejections.

#### Distinctions over the Carlson '758 Reference

The Carlson '758 reference is directed to stabilized tetrafluoroethylene-fluoroolefin copolymers having methyl ester end-

groups (see Abstract). The Examiner also cites Col. 1, lines 29-64 and Col. 4, lines 63-67 (referring to Bro '763).

However, Applicants respectfully submit that the copolymers in Carlson '758 are not molten. Thus, neither unstable terminal groups nor unstable bonds would be removed in order to achieve a volatile index decrease to 25 or less. In other words, the Carlson '758 reference fails to disclose all features as instantly claimed.

In addition, a *prima facie* case of obviousness cannot be based on Carlson '758 when the polymers in Carlson '758 are not molten and do not produce a volatile index as instantly claimed. Thus, none of the requirements for a *prima facie* case of obviousness have been satisfied. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw these rejections.

#### Distinctions over the Goldmann '464 Reference

The Goldmann '464 reference is directed to labile ends groups in fluorinated thermoplastics, whereby carboxyl and acid fluoride groups are converted into carboxamide groups when the polymer is treated with an aqueous, ammonia-containing solution (see Abstract; Col. 3, lines 33-64).

However, the heating temperature in the process of Goldmann '464 is "at atmospheric pressure about 100°C" (see Col. 3, lines 39-40). Such a temperature is significantly lower than the melting



point of the TFE-HFP copolymers. As a result of the Goldmann '464 process, the volatile materials cannot be sufficiently removed. Thus, the Goldmann '464 process creates a treated polymer that does not have a spin density as instantly claimed. Further, the Goldmann '464 process cannot achieve a copolymer having a volatile index of 25 or less, also as instantly claimed. Thus, Goldmann '464 fails to disclose all features as instantly claimed.

In addition, a *prima facie* case of obviousness cannot be based on the Goldmann '464 reference when its polymers will not have the spin density and volatile index as achieved by the present invention. In other words, there are simply too many differences between the present invention and Goldmann '464 that one skilled in the art would have to account for in order to produce the present invention. Thus, a *prima facie* case of obviousness has not been formed with regard to Goldmann '464. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw these rejections.

#### Conclusion

Based on the above remarks, Applicants respectfully submit that the present invention is patentably distinguishable from the cited references of Schreyer '083, Bailey '435, Roura '351, Carlson '758 (as evidenced by Bro '763), and Goldmann '464. Applicants

respectfully request the Examiner to withdraw all rejections and allow the currently pending claims.

***Information Disclosure Statement of September 8, 2000***

Applicants have not received a copy of the PTO-1449 Form having the Examiner's initials next to each cited reference, whereby this PTO-1449 form was submitted with the Information Disclosure Statement filed on September 8, 2002. Thus, Applicants herein submit a copy of the PTO-1449 form and respectfully request the Examiner to consider each reference and return an initialed copy to Applicants.

A full and complete response has been made to all issues as cited in the Office Action. Thus, Applicants respectfully request that the Examiner pass the application to issue.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicants respectfully petition for a three (3) months extension of time for filing a reply in connection with the present application, and the required fee of \$920.00 is attached hereto.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Eugene T. Perez (Reg. No. 48,501) at the telephone number of the undersigned below.

Attached hereto is a marked-up version of the changes made to the application by this Amendment.


If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachments: Version with Markings to Show Changes Made  
PTO-1449 Form (dated September 8, 2002)

(Rev. 02/20/02)

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims have been amended as follows:

Claim 1. (Twice Amended) A melt formed tetrafluoroethylene-hexfluoropropylene copolymer containing  $1.0 \times 10^{14}$  spins/g or less of unpaired electrons on the carbon atoms in terms of a spin density measured with electron spin resonance at a temperature of 10K and 50 ppm or less of a basic [component.] component and having a volatile index (VI) of 25 or less.

Claim 4. (Twice Amended) The melt formed tetrafluoroethylene-hexfluoropropylene copolymer according to claim 1 or 2, which is obtained by adding 0.1 to 10 % of a compound comprising an alkali metal or an alkaline earth metal in terms of the number of atoms of the alkali metal or the alkaline earth metal based on the total number of the above terminal [groups, 0.1 to 10 % by ammonia in terms of the number of ammonia molecules based on the total number of the above terminal groups, or 0.1 to 10 % of a compound having an ammonia group in terms of the number of ammonia groups based on the total number of the above terminal] groups to the tetrafluoroethylene-hexfluoropropylene copolymer, and heating the tetrafluoroethylene-hexfluoropropylene copolymer at a temperature

of at least 200°C in an atmosphere containing [moisture.] moisture  
while kneading.

ADM/cqc